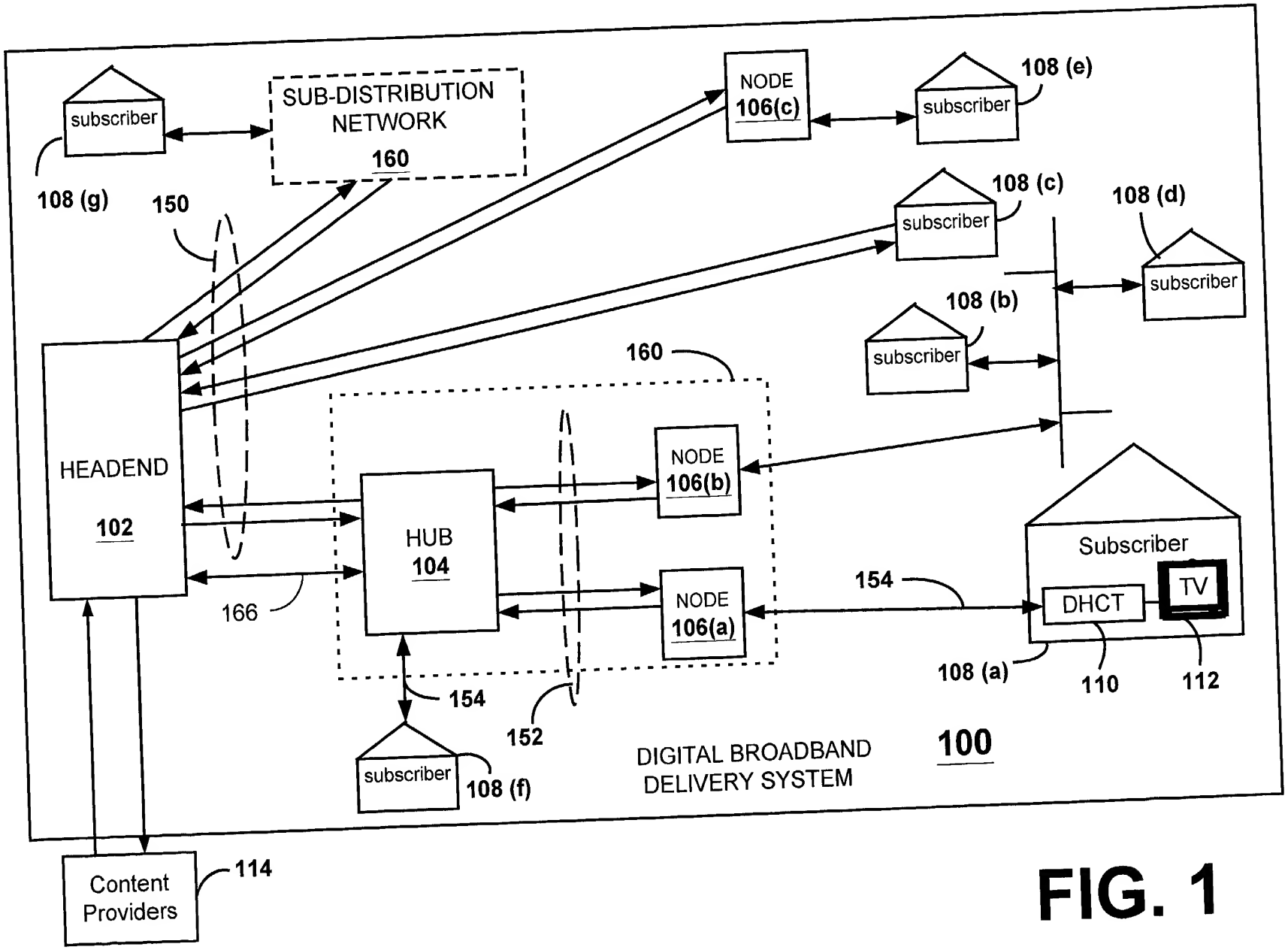
subscriber
SUB-DISTRIBUTION NETWORK
160
NODE 106(c)
subscriber
108 (e)
108 (g)
150
subscriber
108 (c)
108 (d)
subscriber
108 (b)
subscriber
160
HEADEND
102
NODE 106(b)
HUB 104
NODE 106(a)
Subscriber
DHCT
TV
154
166
108 (a)
110
112
154
152
subscriber
108 (f)
DIGITAL BROADBAND DELIVERY SYSTEM
100
Content Providers
114

FIG. 1

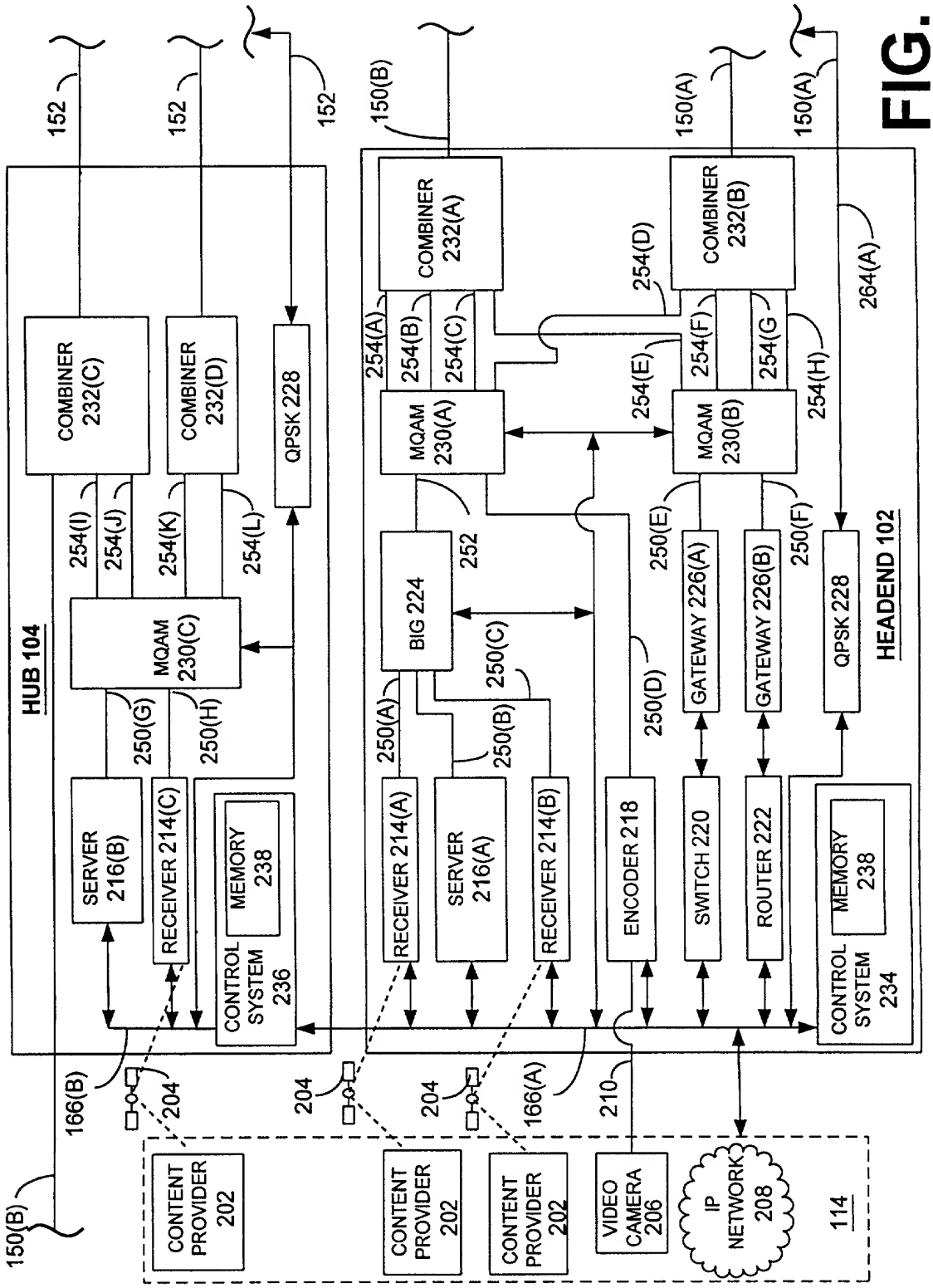
HUB 104
HEADEND 102
COMBINER 232(C)
COMBINER 232(D)
COMBINER 232(A)
COMBINER 232(B)
QPSK 228
MQAM 230(C)
MQAM 230(A)
MQAM 230(B)
BIG 224
SERVER 216(B)
SERVER 216(A)
RECEIVER 214(C)
RECEIVER 214(A)
RECEIVER 214(B)
MEMORY 238
CONTROL SYSTEM 236
CONTROL SYSTEM 234
ENCODER 218
SWITCH 220
ROUTER 222
GATEWAY 226(A)
GATEWAY 226(B)
QPSK 228
CONTENT PROVIDER 202
CONTENT PROVIDER 202
CONTENT PROVIDER 202
VIDEO CAMERA 206
IP NETWORK 208
114
150(A)
150(B)
152
166(A)
166(B)
204
210
250(A)
250(B)
250(C)
250(D)
250(E)
250(F)
250(G)
250(H)
252
254(A)
254(B)
254(C)
254(D)
254(E)
254(F)
254(G)
254(H)
254(I)
254(J)
254(K)
254(L)
264(A)

FIG. 2

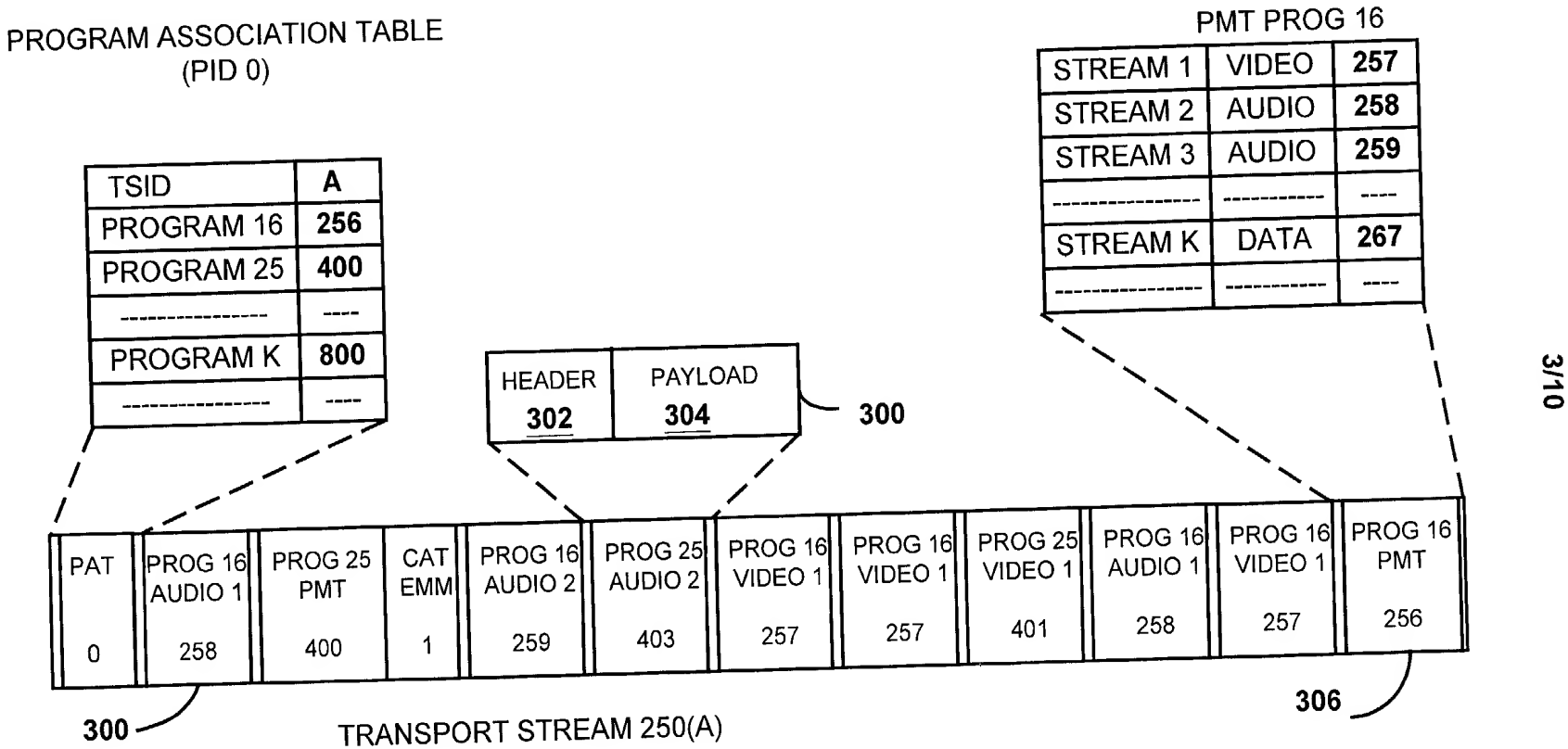
PROGRAM ASSOCIATION TABLE
(PID 0)
TSID A
PROGRAM 16 256
PROGRAM 25 400
PROGRAM K 800
PMT PROG 16
STREAM 1 VIDEO 257
STREAM 2 AUDIO 258
STREAM 3 AUDIO 259
STREAM K DATA 267
HEADER 302
PAYLOAD 304
300
PAT 0
PROG 16 AUDIO 1 258
PROG 25 PMT 400
CAT EMM 1
PROG 16 AUDIO 2 259
PROG 25 AUDIO 2 403
PROG 16 VIDEO 1 257
PROG 16 VIDEO 1 257
PROG 25 VIDEO 1 401
PROG 16 AUDIO 1 258
PROG 16 VIDEO 1 257
PROG 16 PMT 256
300
306
TRANSPORT STREAM 250(A)

FIG. 3

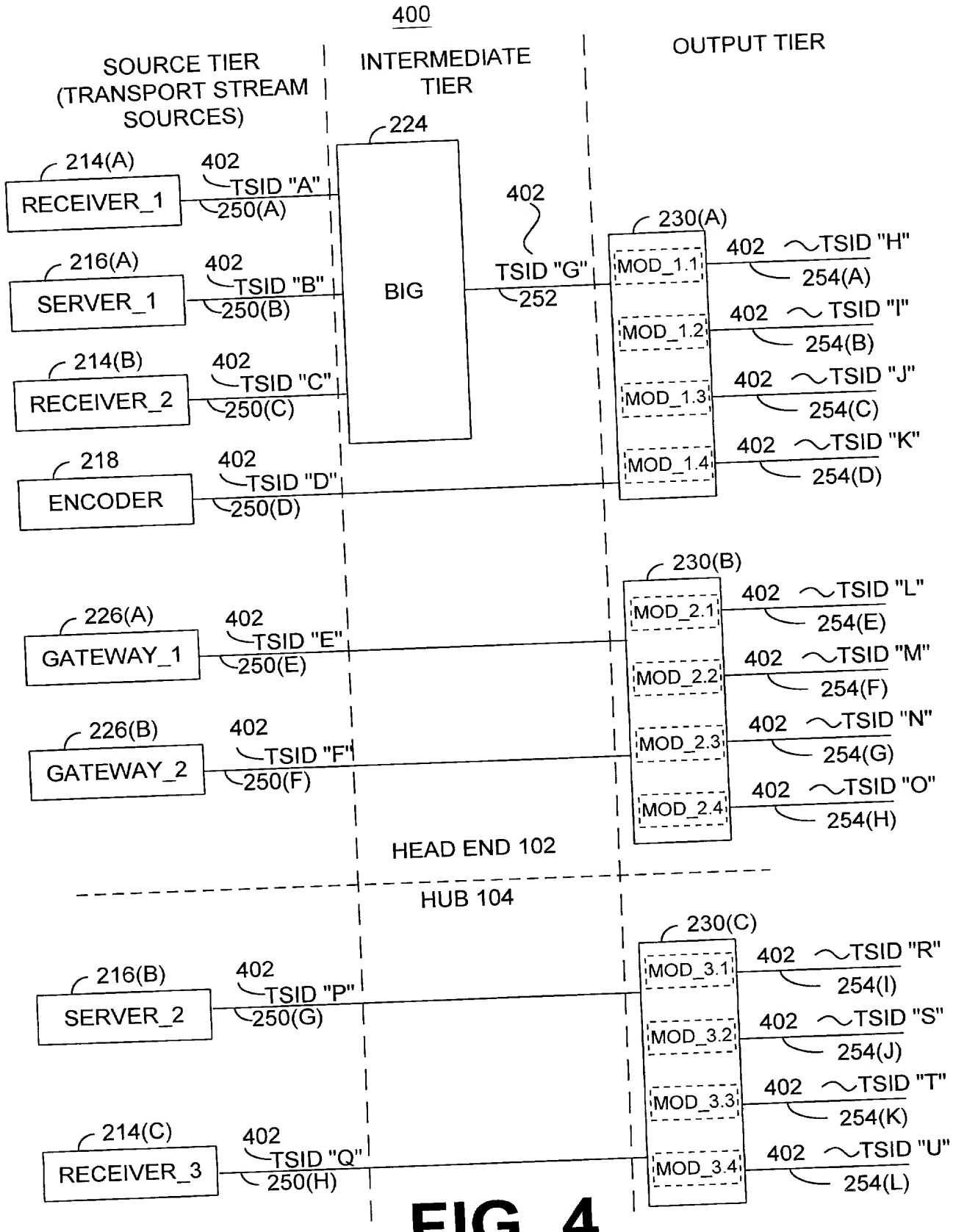
400
SOURCE TIER (TRANSPORT STREAM SOURCES)
INTERMEDIATE TIER
OUTPUT TIER
224
214(A)
RECEIVER_1
402
TSID "A"
250(A)
216(A)
SERVER_1
TSID "B"
250(B)
214(B)
RECEIVER_2
TSID "C"
250(C)
218
ENCODER
TSID "D"
250(D)
BIG
402
TSID "G"
252
230(A)
MOD_1.1
MOD_1.2
MOD_1.3
MOD_1.4
TSID "H"
254(A)
TSID "I"
254(B)
TSID "J"
254(C)
TSID "K"
254(D)
230(B)
MOD_2.1
MOD_2.2
MOD_2.3
MOD_2.4
226(A)
GATEWAY_1
TSID "E"
250(E)
226(B)
GATEWAY_2
TSID "F"
250(F)
TSID "L"
254(E)
TSID "M"
254(F)
TSID "N"
254(G)
TSID "O"
254(H)
HEAD END 102
HUB 104
230(C)
MOD_3.1
MOD_3.2
MOD_3.3
MOD_3.4
216(B)
SERVER_2
TSID "P"
250(G)
214(C)
RECEIVER_3
TSID "Q"
250(H)
TSID "R"
254(I)
TSID "S"
254(J)
TSID "T"
254(K)
TSID "U"
254(L)

FIG. 4

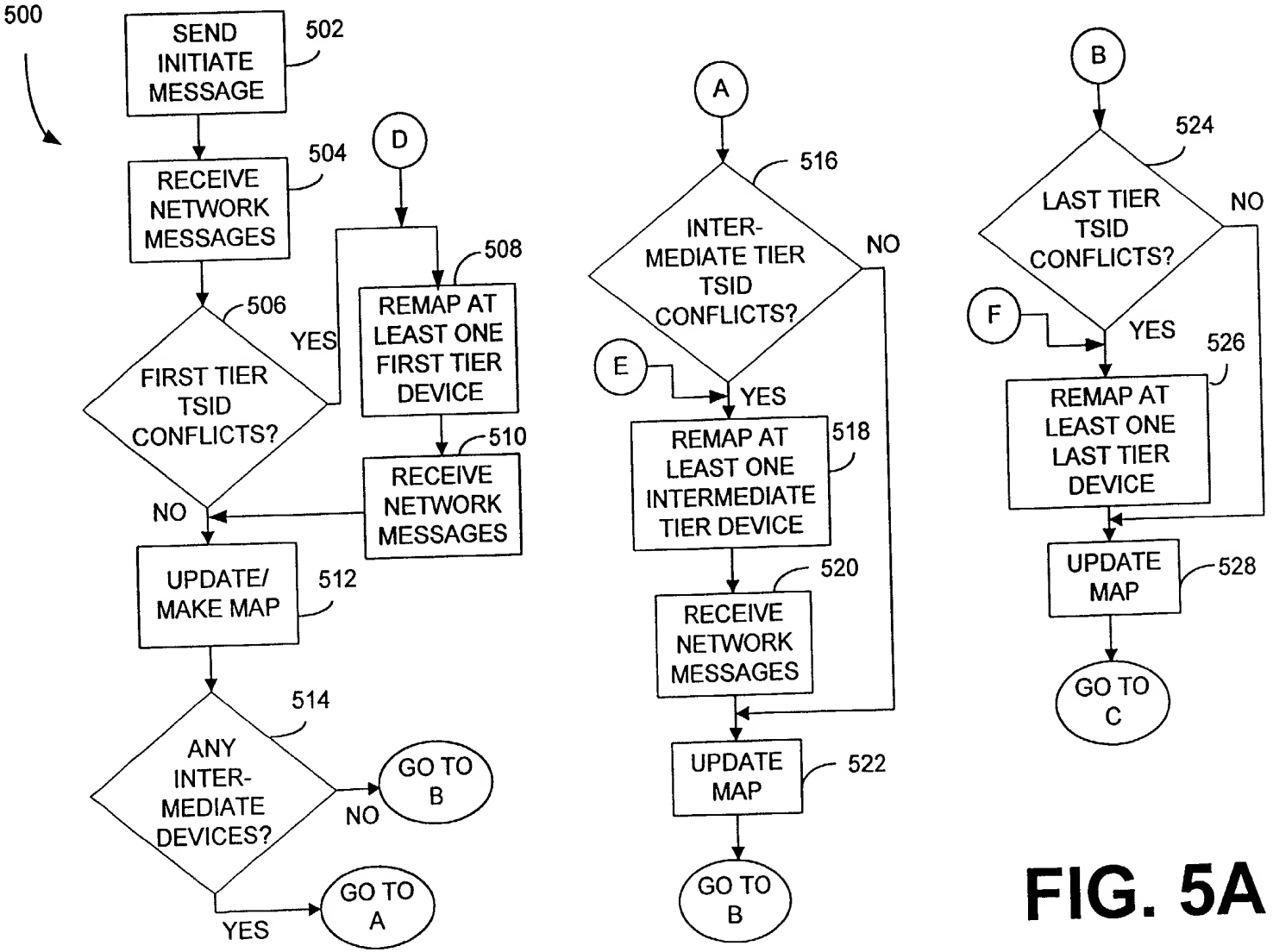
500
SEND INITIATE MESSAGE
502
RECEIVE NETWORK MESSAGES
504
FIRST TIER TSID CONFLICTS?
506
YES
NO
D
REMAP AT LEAST ONE FIRST TIER DEVICE
508
RECEIVE NETWORK MESSAGES
510
UPDATE/ MAKE MAP
512
ANY INTER-MEDIATE DEVICES?
514
NO
GO TO B
YES
GO TO A
A
INTER-MEDIATE TIER TSID CONFLICTS?
516
NO
E
YES
REMAP AT LEAST ONE INTERMEDIATE TIER DEVICE
518
RECEIVE NETWORK MESSAGES
520
UPDATE MAP
522
GO TO B
B
LAST TIER TSID CONFLICTS?
524
NO
F
YES
REMAP AT LEAST ONE LAST TIER DEVICE
526
UPDATE MAP
528
GO TO C

FIG. 5A

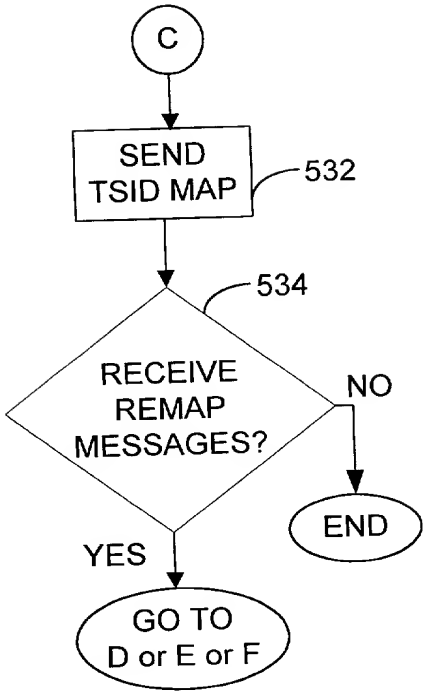

FIG. 5B

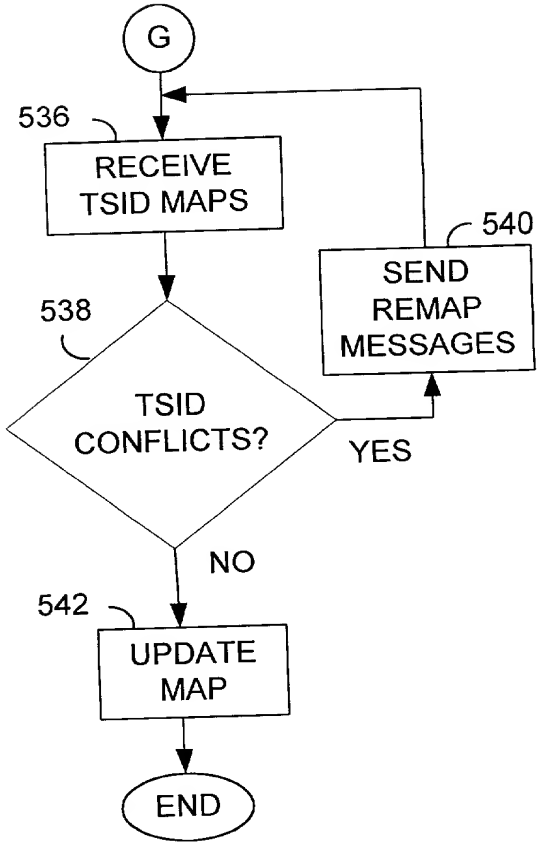

FIG. 5C

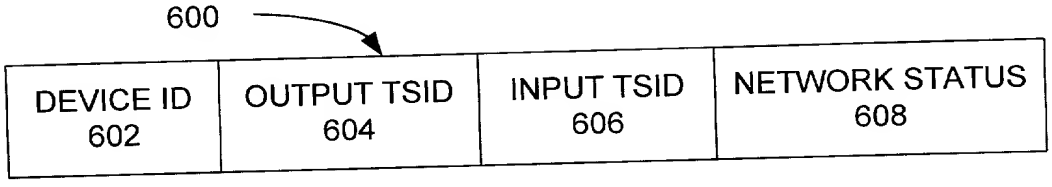

FIG. 6

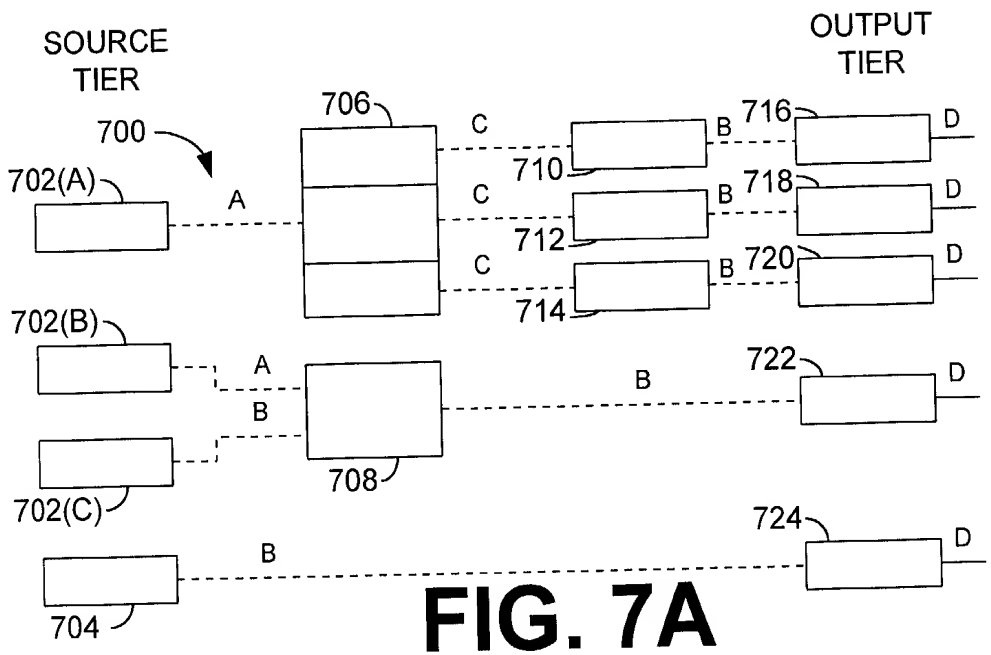

FIG. 7A

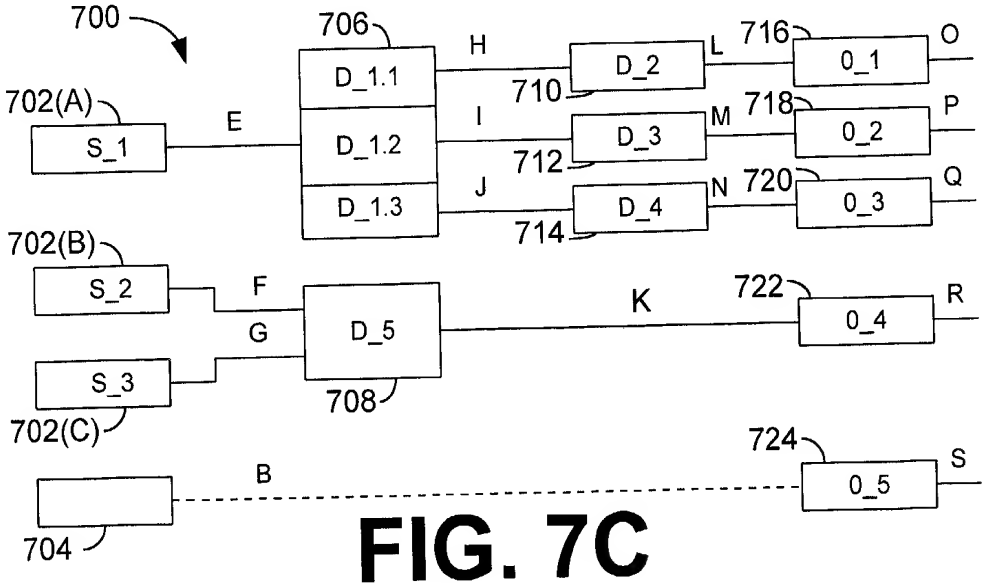

FIG. 7C

752 — 754(A) — 754(B) — 756(A) — 756(B)

DEVICE TYPE	INPUT TSID	OUTPUT TSID	INPUT TSID	OUTPUT TSID
S_1 (702A)	----	A	----	E
S_2 (702B)	----	A	----	F
S_3 (702C)	----	B	----	G
D_1.1 (706)	A	C	E	H
D_1.2 (706)	A	C	E	I
D_1.3 (706)	A	C	E	J
D_5 (708)	(A/B)	B	(F/G)	K
D_2 (710)	C	B	H	L
D_3 (712)	C	B	I	M
D_4 (714)	C	B	J	N
O_1 (716)	B	D	L	O
O_2 (718)	B	D	M	P
O_3 (720)	B	D	N	Q
O_4 (722)	B	D	K	R
O_5 (724)	B	D	B	S

750

FIG. 7B

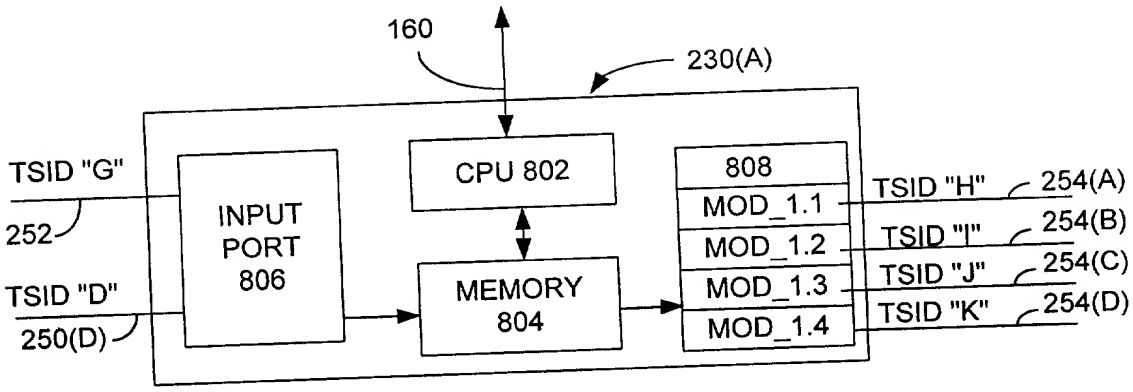
160
230(A)
TSID "G"
252
TSID "D"
250(D)
INPUT PORT 806
CPU 802
MEMORY 804
808
MOD_1.1
MOD_1.2
MOD_1.3
MOD_1.4
TSID "H"
254(A)
TSID "I"
254(B)
TSID "J"
254(C)
TSID "K"
254(D)

FIG. 8

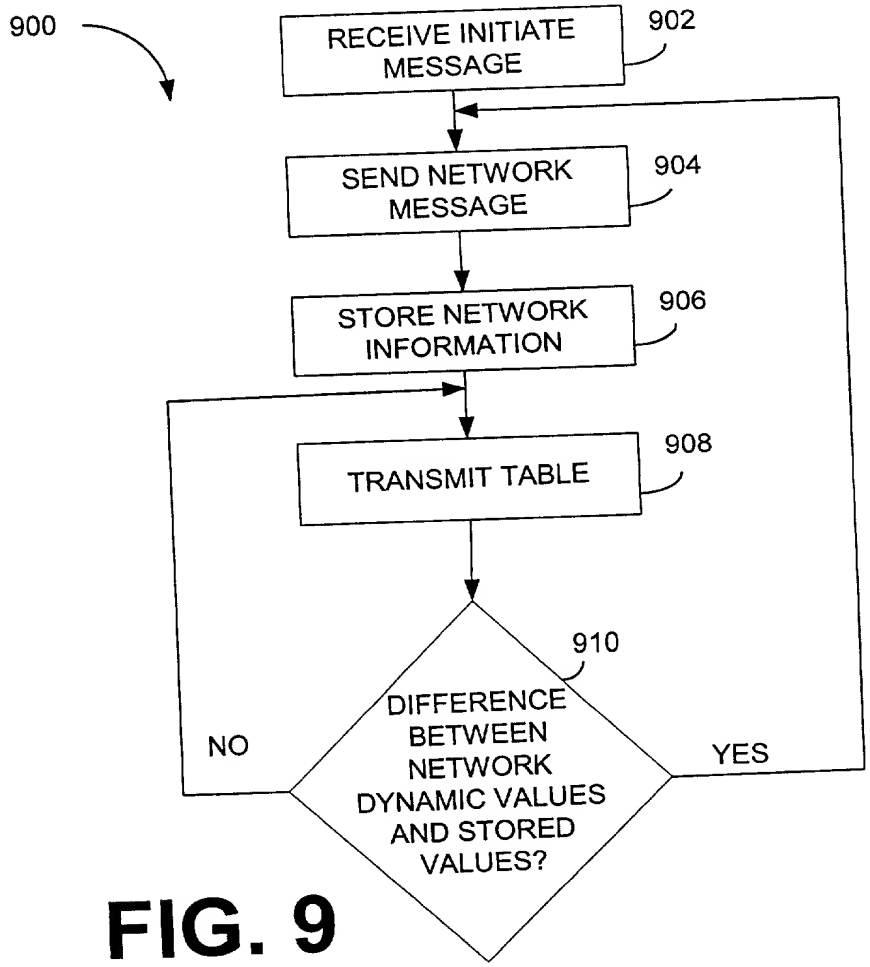
900
RECEIVE INITIATE MESSAGE
902
SEND NETWORK MESSAGE
904
STORE NETWORK INFORMATION
906
TRANSMIT TABLE
908
910
DIFFERENCE BETWEEN NETWORK DYNAMIC VALUES AND STORED VALUES?
NO
YES

FIG. 9

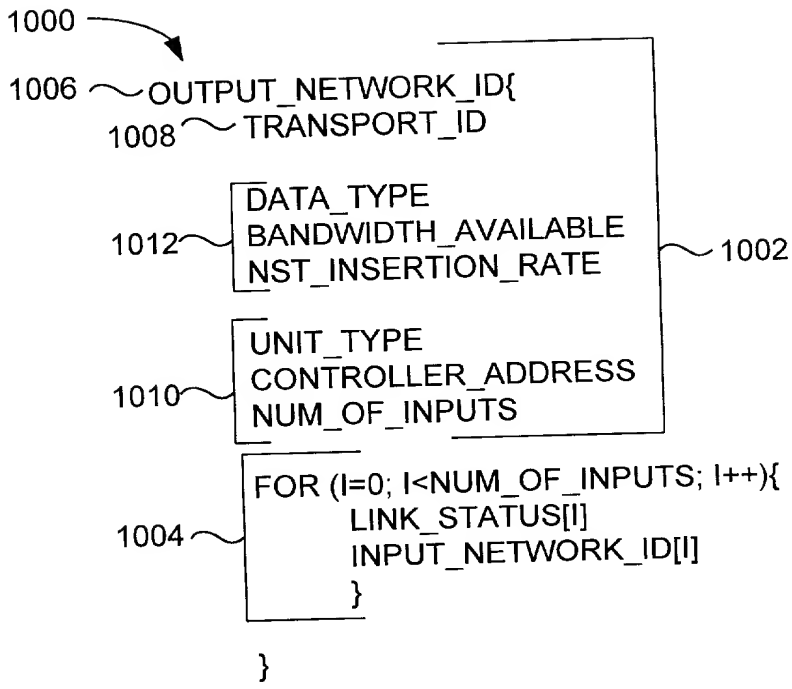
1000
1006
OUTPUT_NETWORK_ID{
1008
TRANSPORT_ID
1012
DATA_TYPE
BANDWIDTH_AVAILABLE
NST_INSERTION_RATE
1002
1010
UNIT_TYPE
CONTROLLER_ADDRESS
NUM_OF_INPUTS
1004
FOR (I=0; I<NUM_OF_INPUTS; I++){
LINK_STATUS[I]
INPUT_NETWORK_ID[I]
}
}

FIG. 10

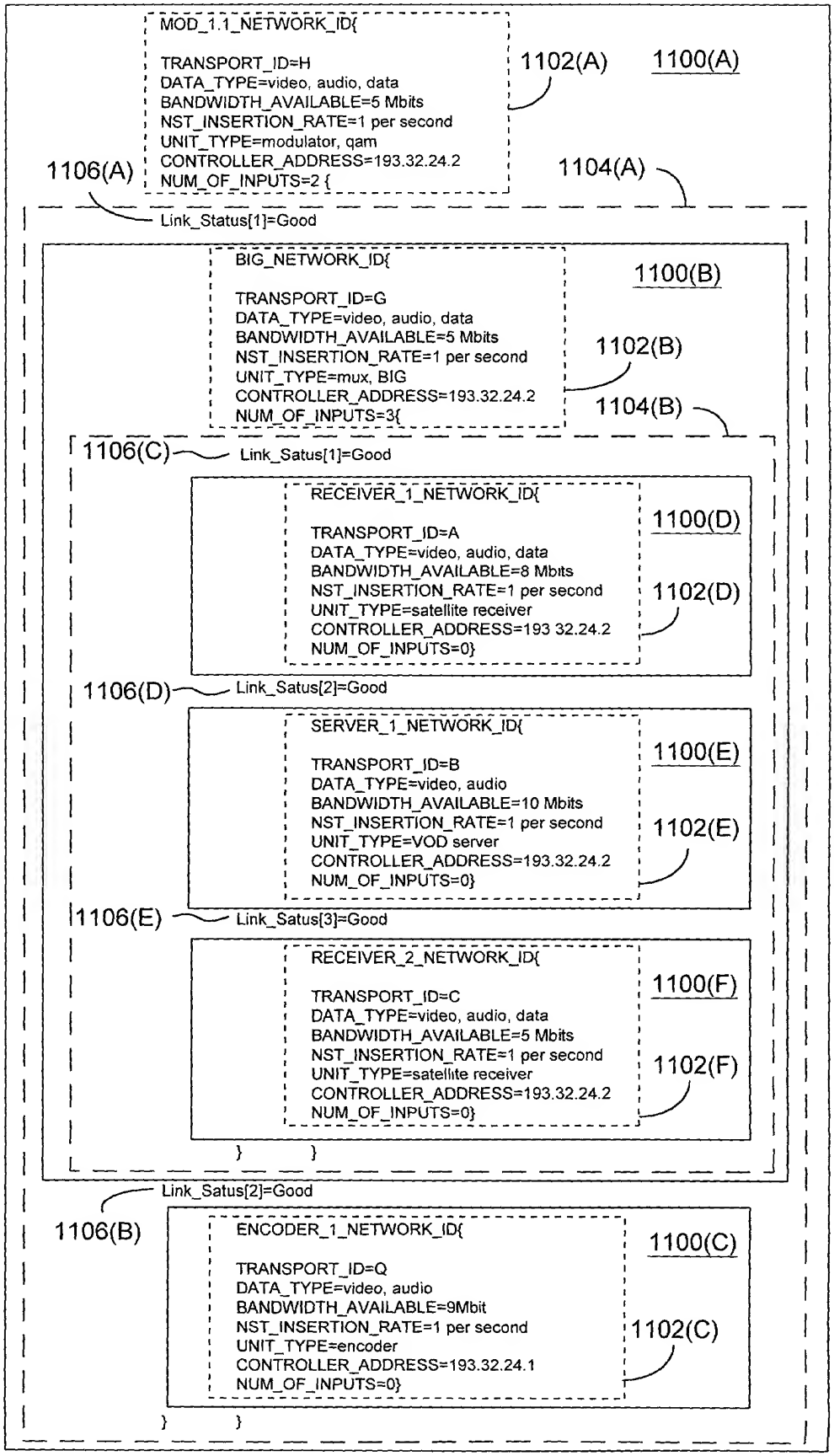
MOD_1.1_NETWORK_ID{
TRANSPORT_ID=H
DATA_TYPE=video, audio, data
BANDWIDTH_AVAILABLE=5 Mbits
NST_INSERTION_RATE=1 per second
UNIT_TYPE=modulator, qam
CONTROLLER_ADDRESS=193.32.24.2
NUM_OF_INPUTS=2 {
1102(A)
1100(A)
1106(A)
1104(A)
Link_Status[1]=Good
BIG_NETWORK_ID{
TRANSPORT_ID=G
DATA_TYPE=video, audio, data
BANDWIDTH_AVAILABLE=5 Mbits
NST_INSERTION_RATE=1 per second
UNIT_TYPE=mux, BIG
CONTROLLER_ADDRESS=193.32.24.2
NUM_OF_INPUTS=3{
1100(B)
1102(B)
1104(B)
1106(C)
Link_Satus[1]=Good
RECEIVER_1_NETWORK_ID{
TRANSPORT_ID=A
DATA_TYPE=video, audio, data
BANDWIDTH_AVAILABLE=8 Mbits
NST_INSERTION_RATE=1 per second
UNIT_TYPE=satellite receiver
CONTROLLER_ADDRESS=193 32.24.2
NUM_OF_INPUTS=0}
1100(D)
1102(D)
1106(D)
Link_Satus[2]=Good
SERVER_1_NETWORK_ID{
TRANSPORT_ID=B
DATA_TYPE=video, audio
BANDWIDTH_AVAILABLE=10 Mbits
NST_INSERTION_RATE=1 per second
UNIT_TYPE=VOD server
CONTROLLER_ADDRESS=193.32.24.2
NUM_OF_INPUTS=0}
1100(E)
1102(E)
1106(E)
Link_Satus[3]=Good
RECEIVER_2_NETWORK_ID{
TRANSPORT_ID=C
DATA_TYPE=video, audio, data
BANDWIDTH_AVAILABLE=5 Mbits
NST_INSERTION_RATE=1 per second
UNIT_TYPE=satellite receiver
CONTROLLER_ADDRESS=193.32.24.2
NUM_OF_INPUTS=0}
1100(F)
1102(F)
} }
Link_Satus[2]=Good
1106(B)
ENCODER_1_NETWORK_ID{
TRANSPORT_ID=Q
DATA_TYPE=video, audio
BANDWIDTH_AVAILABLE=9Mbit
NST_INSERTION_RATE=1 per second
UNIT_TYPE=encoder
CONTROLLER_ADDRESS=193.32.24.1
NUM_OF_INPUTS=0}
1100(C)
1102(C)
} }

FIG. 11